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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/031,570	03/28/2002	Joseph T. Verdeyen	217075US2PCT	6392

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EXAMINER	
KERVEROS, JAMES C	

ART UNIT	PAPER NUMBER
2133	

DATE MAILED: 06/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/031,570	VERDEYEN ET AL.
	Examiner	Art Unit
	James C Kerveros	2133

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 May 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 January 2002* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *5/6/03, 1/22/02*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-13 are pending and are presently under examination.

Drawings

2. New corrected drawings are required in this application because they do not constitute formal drawings due to the improper character size. Applicant is advised to employ the services of a competent patent draftsperson outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dobkin (US 5691642) in view of Haas et al. (US 3885874).

Regarding independent Claims 1 and 8, Dobkin substantially discloses a system and a method for accurately characterizing the electron density and distribution of

plasma confined in a chamber on the basis of high-frequency broadband electromagnetic measurements, comprising:

A plasma chamber (10, FIG. 1) containing plasma;

A frequency source, such as wideband microwave source 26, for providing a frequency spectrum (FIG. 3) to the plasma chamber, which shows a calibration spectra and nominal chamber response measured in the presence and absence, respectively, of a plasma within the resonant chamber of FIG. 1.

Frequency source (26) for providing a microwave energy over a predefined calibration spectrum (e.g., 3 to 6 GHz) to the interior of the resonant chamber 10 via exciting antenna 16, where the spectrum can have a sweep range (6 to 3 GHZ) of decreasing of increasing frequency.

A resonance frequency detector (37, FIG. 1) for detecting the response corresponding to the decreasing and increasing frequency calibration spectrum, from the resonant chamber through sensing antenna 18, of the signal intensity of microwave transmission in the presence of a plasma within a resonant chamber at various frequencies over a frequency range encompassing a plurality of resonant frequencies of the chamber, (cited in claim 23 of the reference and FIG. 3).

A comparator for determining the difference between a number of frequencies in the first and second sets, such as determining a set of calibration spectra using network analyzer 28 by comparing the microwave power delivered by the microwave source 26, as the first set, at a specific resonant frequency of the chamber 10 to the power

measured at that resonant frequency, as the second set, by the network analyzer 28, (col. 6, lines 42-60).

Determining a plasma electron density using the calibration spectrum described above and a test spectrum obtained by measuring transmission of electromagnetic energy through subject plasma. Values of the subject plasma are then determined by analyzing the test spectrum using the reference parameter transformation (col. 4, lines 8-16).

Dobkin does not explicitly disclose the limitation of "calculating a fringe order of the plasma and determining a plasma electron density of the plasma based on the fringe order". However, Haas, in an analogous art, discloses detecting the resultant fringe pattern (variations of output intensity) directly related to electron number density changes of the plasma. The method for measuring the electron density of the plasma, among other steps, consists of interacting the light circulating in the resonator and through the plasma with laser light that is injected into the resonator anew to produce the desired output fringe pattern, and detecting the resulting fringe pattern which is related to the plasma electron density. FIG. 2 shows a typical graphical presentation of the fringe pattern detected by detector 44 and displayed by the oscilloscope 48, where the spacing between adjacent peaks indicates of the rate at which plasma density is changing in time, (see SUMMARY OF THE INVENTION and FIGS. 1 and 2).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to incorporate the method of detecting the resulting fringe pattern based on the plasma electron density, as taught by Haas, in the plasma

electron density apparatus of Dobkin, since incorporating fringe detection provides significant improved time response for measuring changes in the plasma electron density.

Regarding Claims 2, 3 and 9, Dobkin discloses a frequency source 26, which is wideband microwave source, where the wideband microwave source 26 and network analyzer 28 are realized using instruments such as programmable Hewlett Packard HP8350B and HP8757A, respectively, (col. 5, lines 32-36).

Regarding Claims 4, 5, 10 and 11, Dobkin discloses plasma chamber (10, FIG. 1) comprising a resonator having a plasma, where the resonator comprises plural antenna reflectors (16 and 18), wherein the input and output connections are made to reflectors 16 and 18, respectively, as shown in FIGS. 2A and 2B of an antenna assembly for coupling electromagnetic energy to and from the resonant chamber of FIG. 1.

Regarding Claims 6 and 12, Dobkin discloses a Hewlett Packard HP8350B and HP8757A having a data input device, such as keyboard inherent to every network analyzer, for entering a desired plasma electron density.

Regarding Claims 7 and 13, with respect to claimed limitation of plasma generator controller for controlling the plasma generator, Dobkin describes in (col. 2, lines 1-15) that the plasma frequency for typical plasmas generated under laboratory conditions ranges from a few hundred MHz to about 30 GHz, such techniques typically involve the introduction of a microwave beam into the plasma. The wideband microwave source 26 is also used as a plasma generator, which provides a microwave energy

spectrum (3 to 6 GHz), which is within the range as cited by Dobkin for generating plasma. Furthermore, Dobkin discloses a programmable Hewlett Packard HP8350B and HP8757A, corresponding to the microwave source 26 and the network analyzer 28 respectively, for controlling the plasma generator to produce the desired plasma electron density based on the density calculated by the density calculator, (col. 5, lines 32-36).

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James C Kerveros whose telephone number is (703) 305-1081. The examiner can normally be reached on 9:00 AM TO 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on (703) 305-9595. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

U.S. PATENT OFFICE
Examiner's Fax: (703) 746-4461
Email: james.kerveros@uspto.gov

Date: 27 May 2004
Office Action: Non-Final Rejection

By: _____

James C Kerveros
Examiner
Art Unit 2133

Gregory J. Lamarre
for

Albert DeCady
Primary Examiner